

Research Article

# Evaluation of the Collaborative Capability of the Local Government in the Implementation of Collaborative Governance in the Hazardous and Toxic Waste (B3) Control Program in Dumai City

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**Abstract:** The management of hazardous and toxic waste (B3) presents a major challenge in environmental governance, particularly in industrial areas such as Dumai City. Although regulations such as Dumai City Regional Regulation No. 5 of 2017 have been established, the evaluation of the local government's collaborative capability in B3 waste control remains suboptimal. This study formulates the research question: how can the collaborative capability of the local government be evaluated in the implementation of Collaborative Governance within the B3 control program in Dumai City? The theoretical framework applied is the Collaborative Capability Evaluation Theory, which consists of four key dimensions: relational, structural, resource, and adaptive capacities. This research employs a qualitative case study approach using interviews, observations, and documentation techniques. The findings indicate that the local government's collaborative capability is at a moderate level. The main barriers lie in inter-actor trust, inter-agency coordination, and limited resources. Strengthening the four dimensions of collaborative capability is essential to achieving effective, participatory, and sustainable environmental governance in Dumai City.

**Keywords:** Adaptive Capacity; Collaborative Capability; Collaborative Governance; Environmental Governance; Hazardous Waste

## 1. Introduction

Environmental management has become a strategic challenge in modern public administration, especially in regions facing pressures from industrial growth and rapid urbanization. In Indonesia, the issue of hazardous and toxic waste (B3) requires a governance approach that is not solely based on government regulation but also emphasizes collaboration among multiple actors — including government, industry, and society (Rachman, R. M., 2025).

Globally, hazardous and toxic waste management poses a serious challenge to environmental sustainability. Both developed and developing countries face increasing volumes of industrial waste that are difficult to decompose and have the potential to contaminate ecosystems. Improper disposal of hazardous waste leads to environmental degradation, reduced soil and water quality, and adverse impacts on human health (Mukti, W. A. W., 2024).

The issue of B3 waste is closely related to the achievement of the Sustainable Development Goals (SDGs), particularly Goal 3 (Good Health and Well-being), Goal 6 (Clean Water and Sanitation), and Goal 12 (Responsible Consumption and Production). Poor B3 waste management threatens public health, contaminates water sources, and hampers

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sustainable development efforts. Therefore, B3 waste control is a strategic step to support the successful implementation of the SDGs at national and local levels (United Nations, 2025).

Environmental issues in Indonesia have become increasingly complex in line with rapid industrialization and population growth. One of the main challenges is the suboptimal management of hazardous and toxic waste (B3). Many regions face limited infrastructure, weak oversight, and low industry awareness of the impact of B3 waste on health and ecosystems. These conditions have resulted in soil, water, and air pollution that threatens environmental sustainability and community welfare across Indonesia (Kurniawan, B., 2019).

In industrial cities such as Dumai, the pressures are complex: rapid industrial expansion, potential violations in B3 waste management, and the need for active stakeholder participation. Although the Dumai City Regional Regulation No. 5 of 2017 on Environmental Protection and Management has been enacted, significant environmental pollution persists, indicating that policy implementation has not been fully effective.

Within the framework of public administration, access to local government institutional capacity and inter-actor collaboration dynamics is essential to ensure that policies are not only formulated but effectively implemented. Therefore, evaluating the collaborative capacity of local government in managing the B3 waste control program in Dumai is theoretically and practically important.

The main problem addressed in this study is that collaboration has not yet been optimally implemented in Dumai City through the Environmental Agency (DLH). Despite existing regulations, industrial support for environmentally friendly B3 waste management and compliance with regulations remains weak. Furthermore, both industry and the public are not adequately involved in decision-making processes related to B3 waste management. This has led to weaknesses in inter-actor coordination, communication, stakeholder trust, as well as resource management and the government's adaptive capacity.

This study aims to evaluate the collaborative capacity of local government in implementing a Collaborative Governance model in the B3 Waste Control Program in Dumai City, focusing on institutional capacity, inter-actor coordination, stakeholder communication and trust, resource management, and the government's adaptive capacity.

The novelty of this study lies in its focus on evaluating the collaborative capacity of local government within the context of implementing Collaborative Governance in the B3 Waste Control Program — an area rarely examined in depth. Previous studies have generally discussed collaborative capacity or policy implementation separately, without linking them comprehensively within an evaluative governance framework.

This research is significant both theoretically and practically. Theoretically, it contributes to expanding understanding of how local government institutional capacity plays a role in realizing effective collaborative governance. It enriches the literature in public administration, particularly in governance studies, by integrating concepts of collaborative capacity, inter-actor coordination, and environmental policy implementation. Through an evaluative approach, this research also provides a conceptual model that can be used to assess the effectiveness of collaboration in other areas of public policy.

Practically, this research provides valuable insights for local governments and stakeholders in Dumai City. The findings can serve as a foundation for developing strategies to enhance institutional capacity, strengthen cross-sectoral coordination, and build more effective communication and trust among government, industry, and society. The results are also expected to offer applicable policy recommendations to promote more transparent, participatory, and sustainable B3 waste management. Thus, this study serves as an essential foundation for realizing collaborative environmental governance oriented toward sustainable regional development.

## 2. Literature Review

The theoretical framework of this study is based on the Collaborative Capacity Evaluation Theory (Rodríguez-Campos, L., 2012). This theory emphasizes that the success of collaboration among actors in public governance is largely determined by the level of collaborative capacity possessed by government institutions in managing relationships, resources, and joint processes. The evaluation of collaborative capacity aims to assess the extent to which public organizations can effectively interact with multiple stakeholders to achieve shared policy goals. Generally, collaborative capacity consists of four main dimensions:

Relational capacity the ability to build trust, maintain open communication, and develop mutual respect among actors. Structural capacity the presence of systems, mechanisms, and regulations that support inter-agency coordination. Resource capacity the ability to manage human, financial, and technical resources to support collaborative activities. Adaptive capacity the ability to learn from experience, adjust strategies, and respond to changes in the policy environment.

Evaluating collaborative capacity in the context of hazardous and toxic waste (B3) management in Dumai City is essential to determine how far the local government is capable of creating effective, participatory, and sustainable governance. The results of this evaluation serve as the basis for strengthening cross-sector collaboration strategies and addressing structural weaknesses in environmental policy implementation.

The Collaborative Capacity Evaluation Theory is relevant as an analytical framework because it comprehensively explains how local government capacity plays a role in building inter-actor collaboration. This theory examines the relational, structural, resource, and adaptive dimensions that are key to the successful implementation of Collaborative Governance in the B3 waste management program in Dumai City.

Previous research by Ahad and Barsei (2023) highlighted the practice of Collaborative Governance in the context of Electronic-Based Government Systems (SPBE). The study focused on inter-organizational collaboration among local government agencies, local policy support, and leadership commitment as key factors in successful implementation. While this research contributes to understanding collaborative dynamics in digital governance, it does not provide an evaluative perspective on the collaborative capacity of government institutions in a comprehensive manner. Therefore, there remains a research gap in assessing how institutional capacity influences inter-actor collaboration, particularly in complex environmental policy contexts such as B3 waste control.

Furthermore, Setiawati and Suparti (2024) examined the collaborative capacity of village governments in implementing Collaborative Governance for family development programs. Their findings indicate that while collaboration with local governments is relatively strong, partnerships with the private sector remain limited. The study highlights the importance of local government capacity but does not systematically evaluate the four dimensions of collaborative capacity relational, structural, resource, and adaptive. Additionally, the study focuses on the village level rather than the regional government level, which faces more complex coordination challenges. This presents a valuable research gap for development at the regional government level, which plays a strategic role in implementing cross-sector policies.

Nugraha, Pratidina, and Apriliyani (2025) conducted a study focusing on the application of Collaborative Governance to improve billboard tax compliance. Their research successfully measured six dimensions of collaboration and demonstrated the effectiveness of collaborative models in the taxation sector. However, the study emphasized collaboration outcomes rather than the internal capacities or capabilities of government institutions to build sustainable collaboration. Similarly, the study by Sitorus and Afni (2025) on the development

of Smart Governance in Toba Regency highlighted collaboration dynamics, actor involvement, and leadership roles, but did not evaluate how collaborative capacity influences the effectiveness of policy implementation.

Based on the gaps identified in previous studies, the novelty of this research lies in its focus on evaluating the collaborative capacity of local governments in implementing Collaborative Governance within the B3 Waste Control Program in Dumai City. Few studies have specifically examined the relationship between collaborative capacity and the effectiveness of environmental policy implementation, particularly in the management of hazardous and toxic substances. This study not only assesses the extent of collaboration but also analyzes the internal capacity of local government in managing inter-actor relationships, resources, and adaptive mechanisms in response to policy dynamics.

Therefore, this research contributes theoretically by advancing the concept of collaborative capacity and practically by providing policy recommendations to strengthen collaborative and sustainable environmental governance at the local level.

### 3. Method

This study employs a qualitative approach with a case study design, aiming to gain an in-depth understanding of how the Collaborative Capacity Evaluation of local governments plays a role in the implementation of Collaborative Governance in the hazardous and toxic waste (B3) control program in Dumai City. This approach was chosen because it enables the researcher to explore contextual and complex data regarding the interaction processes among actors, cross-sectoral coordination mechanisms, as well as the dynamics of trust and commitment in environmental policy implementation (Yin, 2018). The case study focuses on the unit of analysis at the local government level, particularly the Environmental Agency of Dumai City, which serves as the main implementing body for the B3 control program.

The primary data sources in this research consist of informants, including local government officials, program implementers, representatives from industries, and community members involved in environmental monitoring. Informants were selected using purposive sampling, which involves deliberate selection based on their involvement and knowledge of the implementation of the B3 control program (Creswell, 2019). This approach is expected to provide diverse perspectives from stakeholders engaged in collaborative environmental governance.

Data collection techniques include in-depth interviews, participant observation, and document analysis. Semi-structured interviews were conducted to explore informants' experiences, perceptions, and views regarding the effectiveness of collaboration and the challenges encountered during policy implementation (Zahroh, 2025). Observations were carried out in strategic locations such as the Environmental Agency office, industrial zones, and areas affected by B3 activities to gain firsthand understanding of collaboration practices and waste management. In addition, policy documents, annual reports, and local regulations were used as secondary data sources to strengthen field findings.

Data analysis was conducted using a thematic and interpretative approach, following the analytical stages proposed by Miles and Huberman (1994), which include data reduction, data display, and conclusion drawing and verification. This process aimed to identify key themes that reflect the dimensions of collaborative capacity—relational, structural, resource, and adaptive capacities. The collected data were then interpreted to understand inter-actor relationships and the effectiveness of B3 control policy implementation in Dumai City.

To ensure data validity, this study applied source and methodological triangulation by comparing findings from interviews, observations, and policy documents (Lincoln & Guba, 1985). Member checking was conducted by confirming preliminary findings with informants to ensure data accuracy and reliability. Additionally, an extended data collection period was

carried out to obtain a deeper and more comprehensive understanding of the collaborative dynamics in the governance of B3 waste control.

#### 4. Results and Discussion

The evaluation of the collaborative capability of the local government in implementing Collaborative Governance for the hazardous and toxic waste (B3) control program in Dumai City reveals that the effectiveness of collaboration largely depends on the ability of public institutions to build relationships, establish coordination structures, manage resources, and adapt to changes. Overall, the four dimensions of collaborative capability evaluation provide a comprehensive overview of the strengths and weaknesses of cross-actor collaboration in the region.

**Relational Capacity:** The local government has made efforts to build communication and trust with stakeholders such as industries, communities, and environmental regulatory agencies. However, the level of trust remains partial due to differing interests between the government and industrial sectors. Inter-agency communication is not yet fully open, leading to delays and a lack of transparency in information sharing related to B3 waste management. **Structural Capacity:** There are institutional systems and regulations that support the program's implementation, such as Regional Regulations and Standard Operating Procedures (SOPs) for B3 waste supervision. Nevertheless, implementation in the field is not yet consistent. Cross-agency coordination is often hindered by overlapping authorities and the absence of a permanent forum for collaborative evaluation. This condition obstructs synergy among institutions in achieving B3 control objectives. **Resource Capacity:** The local government's ability to provide technical, financial, and human resource support remains limited. Several monitoring and enforcement activities still depend on assistance from the central government or industrial partners. These limitations reduce the effectiveness of monitoring and controlling hazardous waste in the industrial zones of Dumai City. **Adaptive Capacity:** The local government has begun to show progress through efforts to update strategies and policies based on prior evaluations and experiences. However, organizational learning processes are not yet systematic and tend to be reactive to emerging problems rather than proactive and continuous.

In summary, the collaborative evaluation of Dumai City's local government in implementing Collaborative Governance for the B3 control program is at a moderate level, but it requires strengthening in the areas of trust, inter-agency coordination, resource availability, and adaptive learning systems. Enhancing these four dimensions is essential to make multi-actor collaboration more effective, sustainable, and impactful in controlling hazardous and toxic waste in the region.

The study findings indicate that the *relational capacity* of the Dumai City Government in implementing the evaluation of *collaborative governance* for the hazardous and toxic waste (B3) control program has shown progress, though it remains suboptimal. The local government has made efforts to build communication and establish cooperative relationships with various stakeholders, including industries, communities, and environmental supervisory agencies. These efforts are reflected through routine coordination meetings, discussion forums, and the formation of cross-sectoral teams aimed at strengthening inter-actor synergy.

However, the level of trust among stakeholders remains partial. This is primarily due to differing interests, particularly between the government sector, which emphasizes regulatory compliance, and the industrial sector, which prioritizes operational efficiency. As a result, communication among actors is not yet fully open and transparent. Delays in information sharing related to B3 waste management remain one of the main obstacles to building effective collaboration.

This condition suggests that although there is a willingness and collaborative mechanism in place, the *relational dimension* still requires strengthening—especially in fostering mutual trust and creating more open two-way communication. Enhancing relational capacity is essential for ensuring that collaboration becomes more synergistic, transparent, and oriented toward shared goals in B3 waste management.

The study findings reveal that the *structural capacity* of the Dumai City Government in implementing *collaborative governance* for the B3 control program already has a relatively strong institutional foundation. The existence of formal regulations, such as Regional Regulations and Standard Operating Procedures (SOPs) for B3 waste supervision, provides a crucial basis for building inter-agency coordination. This institutional structure reflects the local government's commitment to establishing a system that supports policy implementation in a directed and measurable manner.

Nevertheless, the implementation of these regulations and institutional mechanisms has not been fully consistent in practice. There are obstacles such as overlapping authorities among the Environmental Agency, the Industry Office, and other related institutions, resulting in uncoordinated B3 waste supervision. Furthermore, the absence of a permanent collaborative forum for joint evaluation hinders collective learning and continuous improvement.

This situation indicates that although formal structures are in place, their implementation still faces coordination challenges. Strengthening *structural capacity* is necessary through the establishment of clearer cross-agency coordination mechanisms, regular evaluation forums, and well-defined roles and responsibilities to ensure that collaborative synergy in B3 waste control operates effectively and sustainably.

The study findings demonstrate that the *resource capacity* of the Dumai City Government in supporting the implementation of the B3 control program remains limited. These limitations are evident in the technical, financial, and human resource (HR) aspects that play critical roles in carrying out environmental monitoring and enforcement functions. The insufficient budget allocation has hindered optimal and continuous monitoring activities.

This condition underscores the need for strategies to strengthen the local government's internal capacity—through improving staff competence, providing more proportional budget allocations, and ensuring adequate technical infrastructure. Strengthening these elements will enhance the effectiveness of the B3 control program and support the region's independence in maintaining environmental quality in a sustainable manner.

The study findings show that the *adaptive capacity* of the Dumai City Government has begun to develop through efforts to update strategies and policies based on evaluations of past experiences. However, the process of organizational learning has not yet been systematic and tends to be reactive to emerging issues in the field. In other words, policy changes are often made as responses to problems rather than as results of proactive, long-term planning.

This condition highlights the need to strengthen internal evaluation systems and establish structured organizational learning mechanisms so that the local government can become more adaptive in responding to the dynamics of B3 waste management.

## 5. Conclusion

Based on the research findings, it can be concluded that the evaluation of the collaborative capability of the Dumai City Government in implementing *Collaborative Governance* for the hazardous and toxic waste (B3) control program is at a moderate level. The local government has established institutional and regulatory foundations to support collaboration; however, its effectiveness still faces several challenges. The aspect of trust among actors—particularly between the government, industry, and community—remains partial due to differing interests and limited open communication. In addition, inter-agency

coordination has not been fully optimal due to overlapping authorities and the absence of a sustainable collaborative forum.

In terms of resources, limited technical, financial, and human resource support poses a major challenge in maintaining effective monitoring and control of hazardous waste. Meanwhile, the government's adaptive capacity has started to develop, yet the process of organizational learning remains unstructured and tends to be reactive to emerging issues.

Therefore, the success of *Collaborative Governance* implementation in B3 control in Dumai City largely depends on strengthening four key dimensions: trust, institutional coordination, resources, and adaptiveness. Enhancing these aspects is essential to ensure that inter-actor collaboration runs effectively, sustainably, and produces tangible impacts on environmental conservation efforts.

### Research Suggestions

Based on the research findings and conclusions, several recommendations can serve as a reference for the Dumai City Government to enhance the effectiveness of *Collaborative Governance* implementation in the B3 control program.

First, efforts should focus on strengthening trust and communication among stakeholders by establishing a permanent collaborative forum involving government agencies, industries, communities, and environmental supervisory institutions. This forum can serve as a platform for information sharing, routine evaluation, and the development of shared commitments in hazardous waste control.

Second, it is necessary to improve human and institutional capacity through technical training, enhanced cross-sectoral coordination, and adequate budget allocation to support monitoring and enforcement activities. Additionally, the local government should develop an adaptive learning system based on policy evaluation and innovation so that every experience can serve as a foundation for continuous improvement in B3 management.

### Recommendations for Future Research

To further deepen the findings of this study, two directions for future research are suggested.

First, future studies could examine the effectiveness of cross-sectoral collaborative forums in supporting the sustainability of B3 control programs, focusing on the dynamics of communication, trust, and inter-actor commitment. Such research is crucial to understanding how long-term synergy among institutions can be built and maintained.

Second, subsequent research could analyze the influence of resource capacity and organizational adaptiveness on the success of *Collaborative Governance* implementation through a comparative approach across different regions. This approach would provide a broader perspective on key factors influencing the success of local government collaboration in environmental management and serve as a foundation for formulating more effective and context-specific national policies.

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